Record of Decision Amendment
Purity Oil Sales, Inc. Superfund Site

Fresno County, California
EPA ID: CAD980736151

September 27, 2012

United States Environmental Protection Agency
Region 9
San Francisco, California

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LIST OF ACRONYMS AND ABBREVIATIONS

1,1-DCA	1,1-Dichloroethane
1,2-DCA	1,2-Dichloroethane
1,1-DCE	1,1-Dichloroethene
ARAR	Applicable or relevant and appropriate requirement
CD	Consent decree
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response Compensation and Liability Information System
Chevron	Chevron Environmental Management Company
cis-1,2-DCE	cis-1,2-Dichloroethene
COC	Contaminant of concern
DHS	California State Department of Health Services
DTSC	Department of Toxic Substance Control
EPA	U.S. Environmental Protection Agency
ERD	Enhanced reductive dechlorination
ESD	Explanation of Significant Differences
FFS	Focused Feasibility Study
FS	Feasibility Study
gpm	Gallons per minute
HASP	Health and Safety Plan
IC	Institutional control
MCL	Maximum Contaminant Level
MNA	Monitored Natural Attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and maintenance
OU	Operable Unit
OU-1	Operable Unit 1 – Groundwater and Tanks
OU-2	Operable Unit 2 – Soils
PCE	Tetrachloroethylene
PPE	Personal protective equipment
PRP	Potentially responsible party
Purity Oil	Purity Oils Sales, Inc.

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

RAO	Remedial Action Objective
RDI	Remedial Design Investigation
RI	Remedial Investigation
ROD	Record of Decision
RWQCB	Region Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act of 1986
SVE	Soil vapor extraction
SVOC	Semivolatile organic compound
TBC	To be considered
TCE	Trichloroethylene
trans-1,2-DCE	trans-1,2-Dichloroethene
µg/L	Micrograms per liter
VOC	Volatile organic compound

PART 1: DECLARATION FOR THE RECORD OF DECISION AMENDMENT

A. SITE NAME AND LOCATION

Purity Oil Sales, Inc.
OU-1: Groundwater and Tanks
3281 South Maple Avenue
Malaga, Fresno County, California 93725
CERCLIS Identification No. CAD980736151

B. STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) Amendment presents the revised remedy for the Purity Oil Sales, Inc. (Purity Oil, or Purity, or the site) Operable Unit No. 1 (OU-1), in Malaga, California. This remedy was developed in accordance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) §117 as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) §300.435(c)(2)(ii). This decision, which amends the September 1989 Record of Decision, is based on the Administrative Record file for this site, which will be updated to include this ROD Amendment upon its finalization. The State of California concurs with the selected remedy.

C. ASSESSMENT OF THE SITE

The response action selected in the 1989 Record of Decision, as modified by this ROD Amendment, is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. The remedy selected in 1989 did not fully remove the contaminant mass at the site, and is no longer in operation. Contamination remains above cleanup standards, so an amendment to the ROD is necessary.

D. DESCRIPTION OF THE SELECTED REMEDY

In 1989 the U.S. Environmental Protection Agency (EPA) issued a ROD for OU-1 to address contaminated groundwater at the Purity Oil site. The main components of the original 1989 remedy included:

- Water treatment to remove volatile organic compounds (VOCs), iron, and manganese from the groundwater, including:
  - Extraction of contaminated groundwater to attain federal and state drinking water standards in the aquifer
  - Treatment of contaminated groundwater using greensand and air stripping. Carbon adsorption would be used to control air emissions, if needed
  - Disposal of treated and tested groundwater by use of one or more of the following methods: reinjection into the aquifer, disposal in the North Central Canal or disposal in local infiltration basins
  - Groundwater monitoring to verify contaminant clean-up

  - Provision of an alternate water supply to affected private well owners located northwest of the site
  - Creation of a groundwater management zone extending 1-2 miles from the cleanup source area, to control pumping to maintain groundwater at the desired levels

- Tank Removal
  - Removal and off-site disposal of contaminated wastes in the seven on-site steel tanks
  - Solidification of wastes, if needed, prior to off-site disposal
  - Cleaning, dismantling and off-site disposal of tanks

- This ROD Amendment includes the following components of the original remedy:
  - Continuing the groundwater monitoring program currently in place to verify contaminant clean-up
  - Provision of an alternate water supply to affected private well owners located northwest of the site

- The revised remedy replaces the other components of the original remedy (extracting, treating, and discharging groundwater) with:
  - Monitored Natural Attenuation (MNA)
  - Institutional Controls (ICs) to prevent exposure to any remaining groundwater contamination that exceeds the cleanup goals.

The tank removal was completed in 1990 according to the original ROD, which eliminated the direct exposure. Therefore, this ROD Amendment does not address this aspect of the original ROD.

E. STATUTORY DETERMINATIONS

The Selected Remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. The revised remedy does not meet the statutory preference for treatment as a principal element of the remedy, because the contaminant mass in groundwater has been significantly reduced by operation of the original groundwater extraction and treatment system and by changed site conditions and the effects of an Enhanced Reductive Dechlorination (ERD) pilot study performed at the site.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining in soils on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review cycle triggered by the original remedial action will continue to ensure that the remedy is protective of human health and the environment. Five-Year Reviews will be conducted until they are no longer required under law and EPA policy. The next Five-Year Review is required in 2016.

F. DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD Amendment. Additional information can be found in the Administrative Record file for this site.

- Chemicals of concern and their respective concentrations. (page 11)
- Baseline risk represented by the chemicals of concern. (page 13)
- Cleanup levels established for chemicals of concern and the basis for these levels. (page 15)
- How source materials constituting principal threats are addressed. (page 24)
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD. (page 13)
- Potential land and groundwater use that will be available at the site as a result of the Selected Remedy. (page 28)
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected. (page 25)
- Key factor(s) that led to selecting the remedy. (page 25)

G. AUTHORIZING SIGNATURES

Kathleen Salyer

Kathleen Salyer
Assistant Director, Superfund Division
California Site Cleanup Branch
U.S. EPA Region 9

9/27/12

Date

PART 2: DECISION SUMMARY

A. SITE NAME, LOCATION, AND DESCRIPTION

The Purity Oil site is located on a 7-acre parcel at 3281 Maple Avenue (at Golden State Boulevard) approximately 0.5 miles south of the Fresno city limits in an unincorporated area of Malaga Township (Figure 1). The site is located in a mixed-use area and is surrounded by agricultural and industrial land. The Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) Identification Number is CAD980736151.

The groundwater beneath the Purity Oil site is impacted with 1,1-dichloroethane (1,1-DCA), 1,2-dichloroethane (1,2-DCA), cis-1,2-dichloroethene (cis-1,2-DCE), vinyl chloride, iron, manganese, and arsenic. Other VOCs and semivolatile organic compounds (SVOC) were initially identified as chemicals of concern in the 1989 ROD, but based on current groundwater data these are the only constituents of concern (COC) detected at concentrations above cleanup standards.

Purity Oil Sales is a potentially responsible party (PRP)-lead site and the sole responsible party is Chevron Environmental Management Company (Chevron). The cleanup is PRP-financed. EPA is the lead regulatory agency at the site, and the Department of Toxic Substances Control (DTSC) is the support agency.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Purity Oil re-refined petroleum waste oils at the site between 1934 and 1975. Historically, the easternmost portion of the site included storage and processing facilities for re-refining and recycling operations. The westernmost portion of the site consisted of unlined sumps and storage tanks used for collection and storage of oil and by-products from the refining process. The oil and by-products were disposed of in approximately seven large on-site sludge pits.

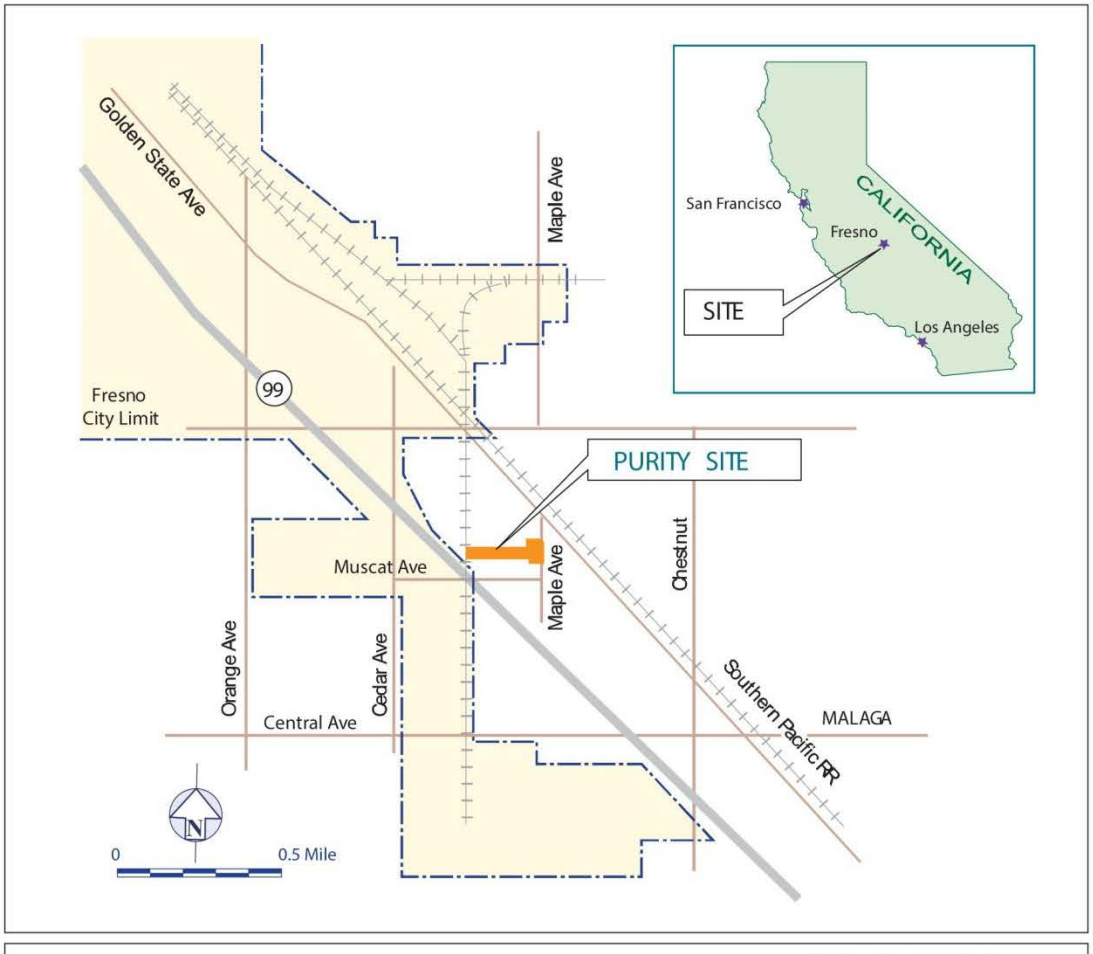
In the 1960s, neighbors of the site noticed contaminant discharges from the site. In 1973, Purity Oil Sales was ordered by the Superior Court to empty and backfill the on-site sludge pits. In 1975, the site owners were issued a Cleanup and Abatement Order under the enforcement authority of the Regional Water Quality Control Board (RWQCB). Purity Oil completely filled the sludge pits with construction debris; no available evidence indicates that the wastes in the pits were ever removed.

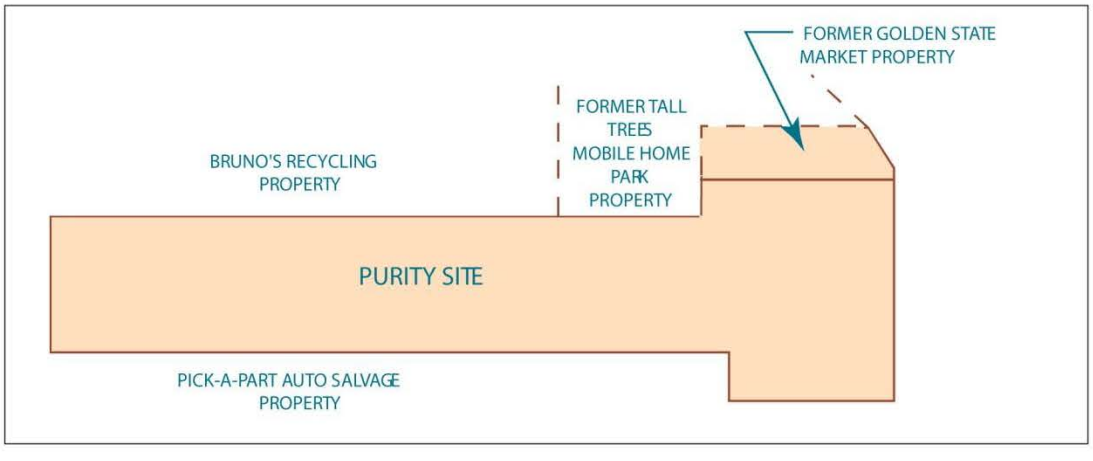
In 1982, the EPA Emergency Response Team, California State Department of Health Services (DHS) and the RWQCB carried out a joint site investigation that included surface and subsurface soil sampling, monitoring well installation, and groundwater sampling. The investigation indicated that on-site soil and groundwater contained compounds which may pose a threat to human health and the environment. The site was listed on EPA's National Priority List (NPL) in December 1982. The DHS was designated as the lead agency for the site and performed a Remedial Investigation (RI) in 1986. During the RI, EPA conducted a removal action to remove 1,800 cubic yards of hazardous oily/tarry materials from the site.

In January 1986, EPA assumed the lead for the site and began an expansion of the RI and Feasibility Study (RI/FS) for the site. The RI report was completed in October 1988 and the FS report in April 1989. In 1987, EPA's emergency response team removed approximately 33,000

gallons of oil and water from one of seven large steel aboveground tanks to eliminate the potential for a spill.

Figure 1 Site Location Map





PURITY OIL SALES SUPERFUND SITE
FRESNO COUNTY, MALAGA, CALIFORNIA

FIGURE 1
SITE LOCATION MAP

OU-1 ROD Amendment

The site remedies were divided into two operable units (OU): OU-1, Groundwater and Tanks, and OU-2, Soils. In 1989, EPA issued the ROD for OU-1 which identified COCs and provided cleanup goals equivalent to the primary federal Maximum Contaminant Levels (MCLs) for the following chemicals: benzene, 1,1-DCA, 1,2-DCA, 1,1-dichloroethylene (1,1-DCE), cis-1,2-DCE, trans-1,2-dichloroethylene (trans-1,2-DCE), trichloroethylene (TCE), vinyl chloride, and carbon tetrachloride. Cleanup goals equivalent to the secondary federal MCLs were established for iron and manganese. The remedy selected in the 1989 ROD included pumping and treating contaminated groundwater to restore the aquifer to beneficial use beneath the property within a reasonable timeframe, development and implementation of a groundwater management zone, and removal and off-site disposal of the seven on-site steel tanks and the contaminated wastes in the tanks.

The seven large steel tanks (containing the remaining used oil processing equipment) were removed by EPA in October 1990. A Remedial Design Investigation (RDI) was performed in 1992, and results were used to better delineate the distribution of COCs in groundwater beneath the site. In 1992, affected downgradient private well users were provided an alternate drinking water supply. The groundwater extraction and treatment remedy was first implemented in 1994 starting with the operation of two extraction wells (EW-1 and EW-2). These wells operated at a combined flow rate of approximately 4 gallons per minute (gpm) until they were temporarily shut down on June 3, 2005 pursuant to EPA's conditional approval of the OU-1 treatability study work plan. They were decommissioned in October 2006 to alleviate complications caused by the well locations during implementation of the OU-2 soil remedy.

The OU-1 Improvement Evaluation, submitted in 2003, used data collected in 2003 to redefine the nature and extent of VOCs in groundwater, and provided a rationale for MNA as the treatment technology for OU-1. In a letter dated December 19, 2003, EPA concurred with the potential for MNA to be an appropriate remedy for part of the groundwater plume, and required evaluation of additional remedial action alternatives for the source area. A Focused Feasibility Study (FFS) for OU-1 was prepared in 2006 which evaluated several remedial action alternatives for the groundwater source area including: MNA; MNA supplemented with ERD; MNA supplemented with ERD and manganese and iron removal; air sparging; MNA enhanced with aerobic biological processes; and enhanced pump and treat. The FFS recommended an ERD pilot study to further evaluate whether ERD would enhance MNA at the site. An ERD pilot study was conducted at the site from August 2008 to September 2010. The results of the study indicated that although ERD reduced VOC concentrations, metals concentrations increased due to reducing conditions. In 2011 an addendum to the FFS was prepared which evaluated the remedial actions which provide the basis for this ROD Amendment. In 2011 and 2012, Chevron submitted two technical memoranda detailing the natural attenuation processes occurring for VOCs and metals, respectively. The FFS Addendum was revised and finalized in 2012.

C. COMMUNITY PARTICIPATION

The Proposed Plan for the OU-1 ROD Amendment for the Purity Oil site was released on August 20, 2012. It is in the Administrative Record file and the information repositories maintained at the EPA Superfund Records Center in Region 9 and at the Fresno County Central Library. The notice of the availability of the Proposed Plan was published in the Fresno Bee on August 20, 2012. The Spanish version of the public notice was published in the local Spanish-language newspaper on August 22, 2012. A public comment period was held from August 20 to September 20, 2012. In addition, a public meeting was held on September 6, 2012 at the Malaga

Elementary School, located at 3910 S. Ward Avenue in Fresno to present the Proposed Plan to the community. No community members attended the public meeting, and no comments were received during the public comment period.

D. SCOPE AND ROLE OF RESPONSE ACTION

EPA has organized the work on the Purity site into two OUs:

- Operable Unit 1: Groundwater and tanks
- Operable Unit 2: Soils

EPA has already selected the remedy for OU-2 in a ROD signed September 30, 1992. The ROD has since been amended by two Explanations of Significant Difference (ESDs), signed in 1996 and 2001, and a ROD Amendment signed in 2006. The main components of the selected remedy for OU-2 include the following; neutralization of contaminated materials and construction of a low-permeability cap to eliminate the risk of human exposure and to reduce surface water infiltration through the waste material that could potentially mobilize contaminants in the vadose zone (and contaminate groundwater); excavation of contamination at adjacent properties; and construction of a soil vapor extraction (SVE) system to eliminate or minimize the diffusion/dispersion of VOCs (primarily1,2-DCE) in the upper vadose zone soil to groundwater and potential receptors at or near ground surface (i.e., potential future structures through vapor intrusion). Neutralization and capping activities, as well as off-site excavations, were completed in 2008. Construction of the SVE system began in 2010 and the system has been operating continuously since July 2010. The ongoing portions of the soils remedy include operation and monitoring of the SVE system and monitoring of groundwater to ensure the effectiveness of both the soil and groundwater remedies. Deed restrictions will be placed on impacted soils in the future to fulfill the requirement for institutional controls.

OU-1, the subject of this ROD Amendment, addresses the contamination of the groundwater aquifer. The selected remedy replaces part of the existing remedy from the 1989 ROD, which was a groundwater extraction and treatment system that was shut down in 2005. The remedy at OU-1 protects human health and the environment in the short term because there are no current exposure pathways to groundwater. However, this ROD Amendment must be put in place to ensure long-term protectiveness. The remedy selected in this ROD Amendment will achieve the only outstanding remedial action objective (RAO): restoration of groundwater to its beneficial use (drinking water). As discussed later in this decision document, groundwater monitoring data collected over recent years demonstrates decreasing levels of contamination in the groundwater. The new remedy, MNA with ICs, addresses the remaining COCs detected at concentrations exceeding cleanup goals.

E. SITE CHARACTERISTICS

Physical Characteristics

The Purity site is located about one-half mile south of the city limits of Fresno at 3281 South Maple Avenue in Malaga, California (Figure 1). The entire 7-acre site is fenced, and the majority of the site is capped. The capped portion of the site is elevated approximately 8 feet above the natural grade and the capped portion slopes towards the perimeter of the site. The northeastern portion of the site includes a small parking lot, two on-site trailers, the active SVE system and components of the previous groundwater remedy.

The site is located in a predominantly industrial area. Properties immediately adjacent to the site include railroad tracks, a scrap metal yard and a used auto salvage yard (Figure 2). The town of Malaga, which has a medium density residential area, surrounds the site at distances of about one-half mile and more. The Purity Oil site is located in the San Joaquin River drainage basin. The San Joaquin River is approximately 12 miles north of the Purity Oil site. There are no natural watercourses in the vicinity of the Purity site. Several irrigation canals flow in the region, including the North Central Canal along the southern site boundary. The North Central Canal is a lateral of the Central Canal. The Central Canal eventually dead-ends approximately 10 miles from the Purity site and has no outlet to any surface drainage course.

Groundwater

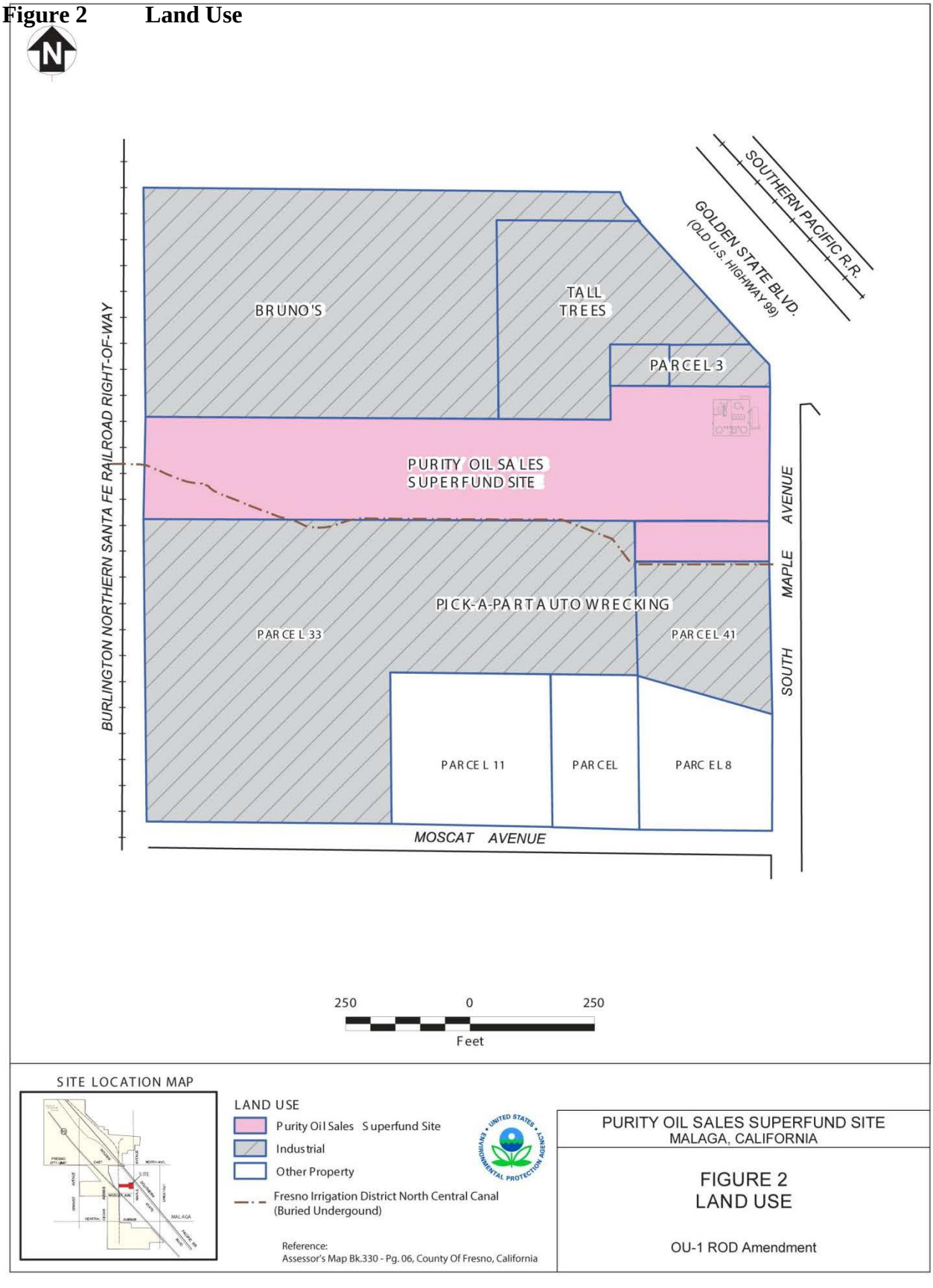
The groundwater aquifer in the Fresno area has been designated as a sole-source aquifer by EPA under the Safe Drinking Water Act. The aquifer in the vicinity of the site is unconfined to depths of several hundred feet. Because there is no confining clay zone layer to restrict vertical groundwater flow, the shallow aquifer underlying the Purity Oil site is probably hydrogeologically connected with deeper aquifer zones which provide domestic water supply for the City of Fresno and surrounding area. However, groundwater within the plume area is not a part of the public water supply system and no private drinking water wells operate in the area.

Depth to groundwater is between 60 and 80 feet, and the direction of groundwater flow is to the northwest. The water-bearing sediments in the Fresno area consist of interbedded lenses and layers of materials ranging from clays to gravels. Silty sands, silts and sands are the predominant soil types encountered beneath the site. As previously stated, the groundwater aquifer in the site vicinity is unconfined to depths of several hundred feet.

Remedial Investigation

After the NPL listing in 1983, EPA performed a supplemental RI that was finalized in 1988. The RI consisted of extensive sampling that characterized the extent of contamination caused by the used oil recycling facility that operated at the Purity Oil Sales site. The source of the groundwater contamination is the buried wastes and contaminated surface and subsurface soils which contain demolition debris, soil and oily/sludge waste pits. The sludge contained a variety of organic contaminants including benzene, toluene, xylene, polyaromatic hydrocarbons, phenols, chlorinated ethenes and ethanes, and chlorobenzene. The contaminated soil and sludge occur in the vadose zone above the contaminated water table, and extend to depths up to approximately 40 feet below the natural ground surface.

Figure 2 Land Use



Removal actions performed pre-ROD and early in the remedy removed the seven on-site above-ground tanks. It is believed the tanks were used to store oil prior to reprocessing and during the acidification process. Waste pits up to ten feet deep covered most of the site, but beginning in the early 1970's the pits were filled with soil, debris and rubble. The former waste pit material was neutralized for pH and the area was capped with an impermeable cap as part of the OU-2 remedy. Further details are provided in the RI/FS and the original ROD, which are included in the Administrative Record. In 2006, Chevron conducted an FFS to evaluate remedial alternatives that would be effective in achieving cleanup standards for remaining COCs in groundwater. The FFS recommended further investigation of the effectiveness of ERD through a pilot study, which was performed between 2008 and 2010. Subsequently, Chevron submitted a FFS Addendum to EPA in 2012.

Extent of Contamination

The contaminated groundwater plume once extended, at least, to an irrigation well located approximately 2,800 feet downgradient of the site. Currently, and over the past five years, the contaminated VOC plume extends less than 300 feet. It is estimated that the vertical extent of groundwater VOC contamination extends to depths of 90 to 130 feet. The iron and manganese plume extends approximately 1,900 feet and extends beyond the Purity Oil property line. The extent of the plume is shown on Figure 3.

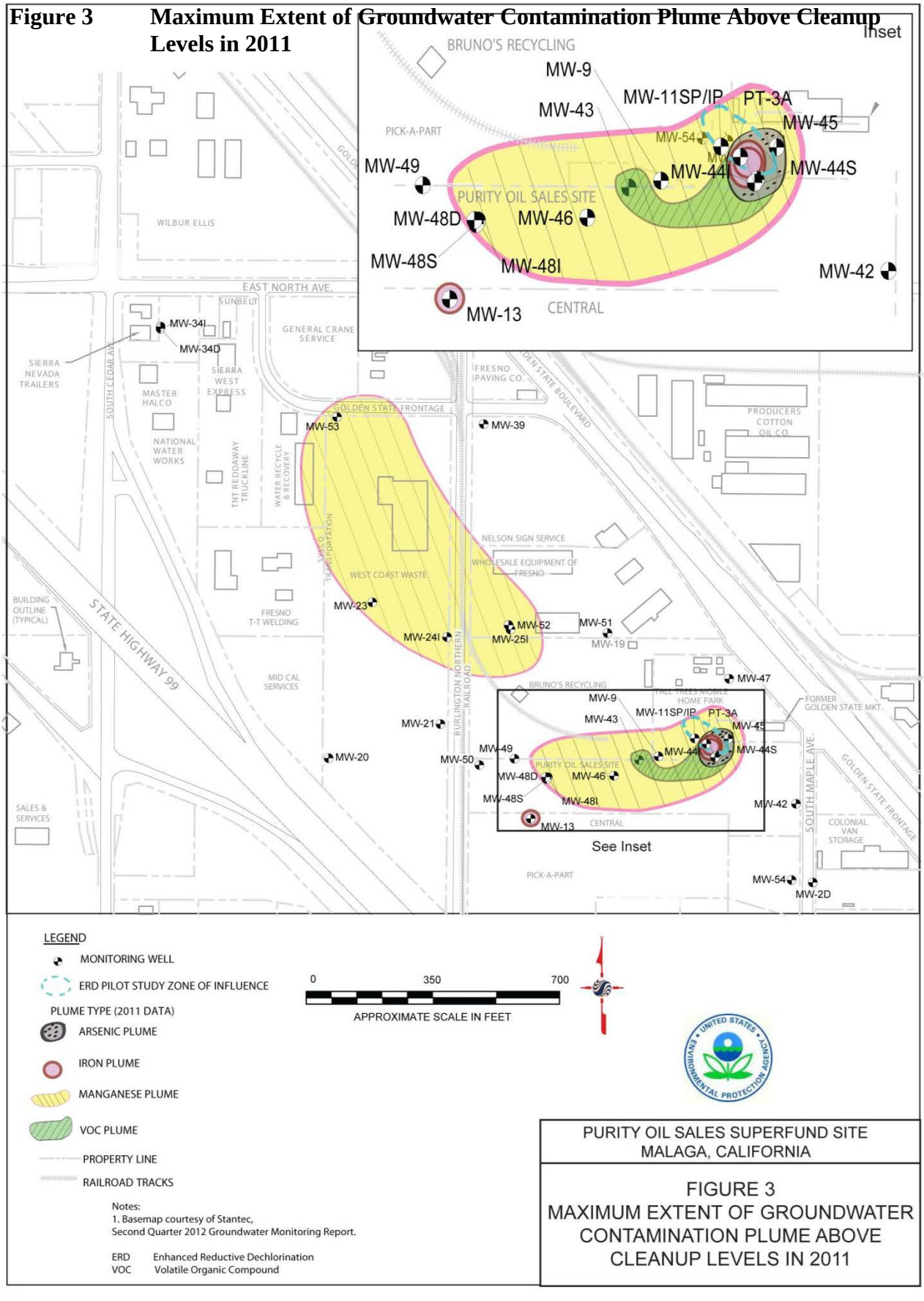
Groundwater contaminants requiring remediation include VOCs, arsenic, iron, and manganese. Total VOC concentrations were originally detected at levels as high as 620 micrograms per liter (μg/L) in the on-site monitoring wells and 14 μg/L in downgradient private wells. VOCs and arsenic are listed as COCs and are known carcinogens. The cleanup standards for iron and manganese were derived from the secondary MCL, which is based on aesthetic drinking water qualities (taste and odor), not on health concerns.

Contaminants of concern in groundwater and their selected cleanup levels are listed in Table 2. Table 1, below, presents COCs in groundwater that have been detected at concentrations above the selected cleanup level in the last year.

TABLE 1: COCS EXCEEDING CLEANUP LEVELS IN GROUNDWATER

Contaminant	Cleanup Standard (μg/L)	Maximum 2011 Concentration (μg/L)
1,2-DCA	0.5	0.9
cis-1,2-DCE	6	7.4
Vinyl chloride	0.5	0.6
Iron	300	6,060
Manganese	50	3,390
Arsenic	10	22.5

Figure 3 Maximum Extent of Groundwater Contamination Plume Above Cleanup Levels in 2011



No exposure pathways currently exist to the affected groundwater. The site is fenced, and contaminated soils are capped on-site. Impacted groundwater is not pumped for industrial or private uses. Since the area surrounding the Purity Oil site is primarily industrial, neither the site nor the surrounding areas provide habitat for or sustain any rare or endangered species of plant or animal. There are no signs of any significant wildlife or vegetation, or any habitat on the site itself, other than grasses planted on the cap and scrubby vegetation.

F. CURRENT AND POTENTIAL FUTURE LAND AND WATER USES

Currently, the site is zoned for industrial use, and the only site uses are related to the cleanup. The site contains several permanent and semi-permanent structures related to the remedy. The current and expected future land use at the Purity Oil site is commercial/industrial. Additionally, institutional controls selected as part of the soils remedy will be implemented to prevent activities that would impact the cap or other components of the remedy, and will ensure future land use at the Purity Oil site remains industrial.

The State of California has designated the groundwater beneath the site as a potential drinking water source. The site overlies the Fresno County Sole Source Aquifer which supplies water for the Cities of Fresno, Malaga, and several other San Joaquin Valley towns. Today, the water supply is handled within the City of Fresno by a division of Fresno's Public Utilities Department, and within Malaga, the water supply is provided by the Malaga County Water District. Over the last 70 years, the average water level in the City has declined approximately 90 feet. The City of Fresno, Malaga County Water District, and the Central Valley RWQCB have programs in place to increase recharge to the aquifer and reduce the amount of groundwater pumped for water supply. The City of Fresno adheres to EPA and DHS water quality regulations, and if water quality in a well does not meet drinking water standards, procedures are in place to remove the well from service or to provide treatment at the wellhead to reduce concentrations to acceptable levels.

There are, however, no current or anticipated future uses of the groundwater surrounding the site. Water is supplied to residents and businesses near the Purity Oil site by the City of Fresno and the Malaga County Water District water supply systems. Groundwater within the plume area is not a part of either supply system and no private drinking water wells operate in the area. Moreover, the site is located within the Malaga County Water District boundary, and the installation of private water supply wells is prohibited for most properties. For those not subject to the prohibition, the local codes (Chapter 14.08 of the current Fresno County Ordinance Code) require submittal of well installation permits to Fresno County and final approval by Malaga County Water District prior to installation. A detailed plan for implementing institutional controls on contaminated groundwater associated with the site will be presented in the post-ROD Remedial Design/Remedial Action Work Plan.

G. SUMMARY OF SITE RISKS

The original Human Health Risk Assessment, included in Volume 2 of the 1986 RI, listed the main exposure pathways: ingestion of contaminated groundwater, contact with contaminated soils, contact with contaminated canal water, and inhalation of dusts by residents nearby the site (a residential mobile home park, located adjacent to the site, was subsequently relocated).

All exposure pathways have been eliminated through site remediation activities, including: soil neutralization and capping, fencing of the site to restrict access, and connection of downgradient water users to the municipal water supply line. There is no short-term human exposure to site contaminants. In order to ensure that there is no long-term risk for human exposure to contaminated groundwater, and to meet the RAO of restoring the aquifer to beneficial use, this ROD Amendment will select a remedy that will address remaining groundwater contamination above the selected cleanup level.

Because "applicable or relevant and appropriate requirements" (ARAR) drove the cleanup at the site, not carcinogenic risk, a new risk assessment was not conducted as part of this ROD Amendment. Additionally, the site does not pose a risk to critical habitats or endangered species because there are no complete exposure pathways to these receptors, so a new ecological risk assessment was not prepared.

Currently, the Purity Oil Site is zoned for heavy industrial land use; however, it is not currently being used for commercial/industrial purposes. Currently, no non-remediation related structures are present on-site and no activities or operations other than remediation activities are underway. Personnel currently working on-site are present intermittently and work in accordance with a site Health and Safety Plan (HASP), which minimizes exposure to on-site COCs. As a result, under current site conditions, there are no on-site human receptors with uncontrolled potential exposure to COCs. Land use in the vicinity of the site is also limited to commercial and industrial use, and is expected to remain zoned for commercial/industrial use in the future.

Although the aquifer impacted by the site contaminants is a potential drinking water source, groundwater within the plume area is not a part of a municipal water supply system and no private drinking water wells operate in the area. Potable water is supplied to residents and businesses near the site by the City of Fresno and the Malaga County Water District water supply systems. Site groundwater usage is currently restricted by an ordinance issued by Fresno County and Malaga County Water District. Their ordinance functions as the IC, as it prevents use of impacted groundwater in the site vicinity for domestic, industrial, or agricultural uses and will remain in place at a minimum until contaminant concentrations no longer exceed cleanup goal concentrations.

In general, EPA also considers the potential risk to humans of exposure to VOC-impacted groundwater through dermal (skin) contact, ingestion (eating), and/or inhalation (breathing). The ICs currently in place will prohibit exposure to VOC-impacted groundwater through dermal contact and ingestion until contaminant concentrations no longer exceed cleanup goal concentrations. In addition, in early 2011, all groundwater VOC concentrations were below the screening level (based on 2002 draft EPA guidance values) target groundwater concentrations for vapor intrusion.

As summarized here, the risks currently posed by contamination at the site are low and controlled through a combination of remedial actions performed earlier in the site history and ICs that are currently in place. However, the groundwater extraction and treatment remedy selected in 1989 is no longer effective, and the remedy must therefore be amended to accommodate the current conditions at the site. The remedy selected in this ROD Amendment will protect public health or welfare and the environment from actual or threatened releases of hazardous substances into the environment from the site.

H. REMEDIAL ACTION OBJECTIVES

The RAOs in the original OU-1 ROD were:

- Restore the sole-source drinking water aquifer as soon as possible to meet federal and state drinking water standards.
- Provide safe drinking water to down-gradient residents.
- Eliminate the direct exposure threat posed by hazardous wastes in the seven on-site steel tanks.

These are also the objectives of this revised remedy, although the only outstanding RAO is the restoration of the sole-source drinking water aquifer as soon as possible to meet federal and state drinking water standards. The RAO to provide safe drinking water to down-gradient residents was achieved early in the OU-1 remedy when all downgradient users were connected to the municipal water line. The RAO to eliminate direct exposure to on-site hazardous wastes was also addressed early in the OU-1 remedy through the removal of tanks and contaminated soils.

The selected remedial action for OU-1 is intended to satisfy the RAOs to achieve overall protection of human health and the environment. Performance of the selected OU-1 remedy will be measured by assessing progress towards achieving restoration of the aquifer. The selected remedy is expected to achieve cleanup levels within a reasonable timeframe.

Table 2 provides the cleanup standards from the ROD for all the chemicals initially detected in groundwater and adds a cleanup standard for arsenic. Although arsenic has been on the COC list since the original groundwater ROD, no cleanup standard was selected, so a cleanup standard is being adopted in this ROD Amendment.

TABLE 2: GROUNDWATER CLEANUP STANDARDS

Contaminant	Cleanup Standard (μg/L)
1,1-DCA	5
1,1-DCE	6
1,2-DCA	0.5
cis-1,2-DCE	6
trans-1,2-DCE	10
Benzene	1
Carbon tetrachloride	0.5
Trichloroethylene	5
Vinyl chloride	0.5
Iron	300
Manganese	50
Arsenic	10

I. DESCRIPTION OF ALTERNATIVES

EPA evaluated five alternatives for the revised remedy at the Purity Oil site:

- Alternative 1: No Further Action
- Alternative 2: MNA with ICs
- Alternative 3: ERD with MNA and ICs
- Alternative 4: Air Sparging with MNA and ICs
- Alternative 5: Groundwater Extraction and Treatment with MNA and ICs

Alternative 1: No Further Action

EPA is required to consider the no further action alternative. Under this alternative no additional treatment would be implemented, and groundwater monitoring would cease. There would be no cost associated with this alternative.

Alternative 2: MNA with ICs (Selected Remedy)

Natural attenuation relies on naturally occurring physical, chemical, or biological processes that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. MNA was included as a remedial alternative in the 2006 FFS and in the 2012 FFS Addendum, and was also detailed in two technical documents: "Analysis of Natural Attenuation of Contaminants of Concern in Groundwater" and "Natural Attenuation Analysis of Select Metals in Groundwater". Lines of evidence show that VOCs and metals concentrations are decreasing primarily through physical, not biological, processes at the site. Based on the most recent years of monitoring data, the remaining wells with VOC concentrations above the MCL are projected to reach the MCL by 2015. Similarly, recent groundwater monitoring results show that the remaining wells with iron and manganese concentrations will meet selected cleanup levels by approximately 2039. Arsenic concentrations have been elevated in two groundwater monitoring wells and are expected to reach the MCL by 2039, at the latest.

MNA relies on natural attenuation processes to achieve site-specific remediation objectives within a timeframe that is reasonable compared to that offered by other more active methods. These in-situ processes include biodegradation, dispersion, dilution, sorption, volatilization, and natural chemical destruction. There is evidence that naturally occurring biodegradation processes have contributed to natural attenuation of constituents in the groundwater, and continued attenuation of VOCs will rely primarily upon physical attenuation processes (dilution) as well as small amounts of biological degradation.

Groundwater monitoring results from the Purity Oil site show that the entire plume is stable and shrinking. Dechlorination products of tetrachloroethene (PCE) and TCE, vinyl chloride and isomers of DCE, and have been detected on site, notably in wells MW-6S and MW-7S. These dechlorination products indicate reductive dechlorination of the parent product (TCE or PCE). In addition, diffusion/dispersion/dilution and volatilization processes are operative at the site, serving to reduce concentrations and the overall amount of VOC mass in groundwater.

This alternative consists of natural attenuation in conjunction with a groundwater monitoring program and ICs. The monitoring program will utilize existing and potentially new monitoring wells located throughout and adjacent to the entire groundwater plume. These will be sampled routinely until concentrations of the COCs are consistently below the cleanup criteria. The net present value associated with the installation of new wells and semi-annual sampling for 30 years is estimated to be $1,331,000. Alternative 2 requires institutional controls to prevent pumping of and potential exposure to contaminated groundwater. The implementation plan of the ICs will be outlined in the Remedial Design/Remedial Action work plan, to be prepared after the finalization of this ROD Amendment.

Groundwater elevation and concentration trends will continue to be evaluated on a routine basis under the site's routine groundwater monitoring program. Should groundwater elevation or concentration trends change in a way that indicates that the amended groundwater remedy is no longer protective, and, correspondingly, groundwater VOC concentrations increase or remain above the cleanup concentrations, site conditions will be evaluated and additional remedial action will be considered.

Alternative 3: ERD with MNA and ICs

The ERD with MNA and ICs alternative would accelerate naturally occurring degradation of chlorinated VOCs by adding electron donors to groundwater and promoting reductive dechlorination. Four vertical extraction wells and three horizontal injection wells are assumed to be necessary, based on ERD pilot study results, to extract groundwater and then redistribute groundwater amended with an electron donor solution throughout the source area. Those portions of the plume outside the source area would be addressed through MNA as described in Alternative 2. This alternative would rely on ICs to limit the use of the impacted groundwater until it reaches cleanup levels.

An ERD pilot study was initiated in September 2008 with the injection of a sodium lactate solution into the subsurface of the site. Post-injection monitoring showed that ERD was successful in reducing concentrations of VOCs with the pilot study area. However, ERD created reducing conditions in the treatment area, which increased concentrations of dissolved-phase metals in the groundwater. Data collected during the September 2010 sampling event indicate that the concentrations for these metals (iron, manganese, and arsenic) have stabilized or are decreasing in most wells. Increases in metal concentrations were limited to the areas that were directly influenced by the lactate injection, and did not appear to migrate along the natural groundwater gradient out of the treatment area. However, based on the pilot study data, multiple years of attenuation and monitoring are required following application of the ERD technology to achieve acceptable metals concentrations within the treatment footprint. While ERD is expected to expedite attenuation of VOCs, the timing would likely extend beyond the timeframes discussed for Alternative 2 because continuing the lactate injections could increase metals concentrations. The cost of this option is relatively high due to the proposed use of horizontal wells for delivery. Costs could be reduced by using vertical wells, if proven effective, for delivery of the electron donor. A preliminary net present worth cost is estimated at $2,722,000.

Groundwater elevation and concentration trends will continue to be evaluated on a routine basis under the site's routine groundwater monitoring program. Should groundwater elevation or concentration trends change in a way that indicates that the amended remedy is no longer

protective and, correspondingly, groundwater VOC concentrations increase or remain above the RAO concentrations, additional remedial action will be considered.

Alternative 4: Air Sparging with MNA and ICs

The air sparging option with MNA and ICs would utilize a compressor and approximately 100 wells operating in alternating groups to sparge air into groundwater in the source area. As air bubbles migrate through the saturated zone, VOCs will partition out of groundwater and into the vapor phase. Air sparging will also provide additional oxygen to groundwater, which will promote accelerated attenuation of manganese, iron, and arsenic. Those portions of the plume outside the target air sparging treatment area would be addressed through MNA as described in Alternative 2. This alternative may also need to rely on ICs to limit the use of the impacted groundwater until it reaches cleanup goals.

Alternative 4 requires a refined delivery system to work effectively, requiring a field pilot-test to verify design and operational parameters. To be effective, the system will require a large number of wells making this Alternative less cost-effective. The estimated life cycle cost is $2,995,000.

Alternative 5: Groundwater Extraction and Treatment with MNA and ICs

This alternative would modify the existing pump and treat system to employ a horizontal extraction well to withdraw groundwater from the source area and deliver it to an on-site treatment plant. On-site treatment methods include air stripping, greensand filtration, and addition of potassium permanganate before the water is discharged into the North Central and Central Canals. Those portions of the plume outside the source area would be addressed through MNA as described in Alternative 2.

Site data from the existing pump and treat system may be used to assess a larger scale pump and treat alternative. Pump and treat with vertical wells was selected and implemented as a remedy in the OU-1 ROD. A pump and treat system was installed using two vertical extraction wells to collect groundwater for treatment and was operated continuously from December 1994 until June 2005. The two vertical wells were only extracting 4 gpm of groundwater, so the groundwater extraction system did not effectively address elevated groundwater concentrations. It appears that sorbed VOC mass and site hydrogeologic properties (i.e., low permeability in the area of the extraction wells and heterogeneity of soils), limited the effectiveness of this technology.

The Final (100%) Design Report, OU-1 Groundwater Extraction and Treatment, included the phased installation of up to five extraction wells for the pump and treat option. However, based on the performance of the initial two vertical extraction wells and the limitations stated above, it is anticipated that the addition of more vertical wells would not make groundwater extraction an effective remedy. The two initial wells were only capable of extracting 4 gpm total, well below the target design flow rate of 70 to 150 gpm. As part of the 2006 FFS, this technology was re-evaluated using a horizontal well because desired results had not been attained with vertical wells. It is suspected that many of the same issues will arise with the enhanced pump and treat option. Design of the system would take this information and past experience into account to design the most effective system possible for the site.

The cleanup timeframe for a groundwater extraction and treatment remedy cannot be accurately predicted when contaminant concentrations are very low. However, MNA would occur regardless of the treatment system selected and alone would result in cleanup of VOCs by 2015. The time required to design and install the system could potentially exceed the timeframe for achieving cleanup with MNA. A net present value of $2,693,000 is estimated for this Alternative.

Common Elements and Distinguishing Features

Each of the five remedy alternatives addresses the remaining groundwater contamination at the site. All alternatives, except for the No Further Action alternative, include the following components: institutional controls to prevent exposure to contaminated groundwater, groundwater monitoring, and utilization of MNA as part or all of the remedy.

The key distinguishing feature of the alternatives is the treatment technology employed to reduce the remaining COC concentrations below their respective cleanup standards. Alternative 1 takes no further action to address the COCs in the groundwater. Alternative 2 relies solely on MNA to achieve cleanup levels within a reasonable timeframe. Alternatives 3, 4, and 5 utilize active technologies, which are ERD, air sparging, and groundwater extraction and treatment, respectively. Other distinguishing features related to nine criteria that EPA uses to evaluate remedial alternatives are discussed in the Comparative Analysis section.

Expected Outcomes of Each Alternative

The expected outcome of Alternatives 2, 3, 4, and 5 is the reduction of VOC concentrations below MCLs in the shallow groundwater. Because it does not include further monitoring, Alternative 1 would not demonstrate that a reduction of COCs below their respective MCLs has been achieved. The timeframe to achieve the remedial objectives varies depending upon the alternative, as discussed further in the Comparative Analysis section.

J. COMPARATIVE ANALYSIS OF ALTERNATIVES

EPA evaluates each of the alternatives based on nine standard criteria specified in Section 121(b) of CERCLA. For an alternative to be an acceptable remedy, it must, at a minimum, satisfy the statutory requirements of the two threshold criteria: overall protection of human health and the environment, and compliance with Federal and State ARARs. Balancing criteria include long-term effectiveness and permanence; reductions in toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; and cost. Modifying criteria are State and community acceptance, which will be evaluated after the close of the public comment period. Figure 4 illustrates how each alternative compares to the nine criteria.

Threshold Criteria

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

Figure 4 Comparison of Alternatives

Criteria	No Further Action	MNA with ICs [Preferred]	ERD with MNA & ICs	Air Sparging with MNA & ICs	Extraction & Treatment with MNA & ICs
Overall Protectiveness	○	●	●	●	●
Compliance with State/Federal Requirements	○	●	●	●	●
Long-term Effectiveness and Permanence	○	●	●	●	●
Reduction of Mobility, Toxicity, Volume	○	○	◒	●	●
Short-term Effectiveness	○	●	●	●	●
Implementability	○	●	●	●	●
Cost (NPV*)	0	1.3	2.7	3.0	2.7
Potential for State Acceptance	○	●	◒	●	●
Community Acceptance	No community input received during public comment period.				

● = Fully meets criteria ◒ = Partially meets criteria ○ = Does not meet criteria

* Net Present Value calculated over 30 years, in millions of dollars.

PURITY OIL SALES SUPERFUND SITE
FRESNO COUNTY, MALAGA, CALIFORNIA

FIGURE 4
GROUNDWATER ALTERNATIVES COMPARISON
OU-1 ROD Amendment

Alternatives 2, 3, 4 and 5 will be protective of human health and the environment. The plume is not migrating, and there are no exposure pathways that might harm human or ecological receptors. Alternatives 2, 3, 4 and 5 will reduce COC concentrations in the groundwater to below the selected cleanup level, which is considered protective of human health. ICs are required for these alternatives to restrict groundwater usage in the plume area to be protective of human health and the environment until cleanup goals are met.

Alternative 1 cannot be demonstrated to protect human health and the environment because it would not provide a means to monitor contaminant levels in groundwater.

Compliance with ARARs

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain applicable or relevant and appropriate Federal and State requirements (referred to as "ARARs"), standards, criteria, and limitations unless such ARARs are waived under CERCLA section 121(d)(4). ARARs can be chemical specific, action specific, or location specific. A full list of the ARARs can be found in Appendix A.

At the Purity site, arsenic, vinyl chloride 1,2-DCA, cis-1,2-DCE, iron, and manganese are the only constituents of concern detected at concentrations above cleanup standard. Therefore, their MCLs are considered relevant and appropriate chemical requirements. Alternatives 2, 3, 4, and 5 will reduce the COC concentrations below their respective MCLs, and thus will comply with ARARs. Alternative 1 fails this criterion since it cannot be demonstrated to protect human health and the environment because it would not provide a means to monitor contaminant levels in groundwater.

Balancing Criteria

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls.

Alternative 1 fails this criterion since it cannot be demonstrated to protect human health and the environment because it would not provide a means to monitor contaminant levels in groundwater. The remediation achieved by Alternatives 2, 3, 4, and 5 would be permanent. Successful implementation of these alternatives would clean up the groundwater to drinking water standards, and continued monitoring would ensure that the reduction in concentrations is not temporary. The institutional control preventing installation of private wells within the plume area would also ensure protectiveness until cleanup goals are met.

The effectiveness of the selected remedy for groundwater is partially contingent on the continued depression of the groundwater table. A rise in the groundwater table could potentially affect concentrations of contaminants in groundwater, depending on the progress towards completion of the active OU-2 remedy (soil vapor extraction system). Five-Year Reviews will be necessary for the site, and will provide an opportunity to assess the protectiveness of the selected remedy.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. Historical groundwater monitoring data have demonstrated that the COC groundwater plume is stable and shrinking.

Alternative 1 fails this criterion since it cannot be demonstrated to protect human health and the environment because it would not provide a means to monitor contaminant levels in groundwater.

Alternative 2, MNA, does not meet this criterion because there is no active technology utilized as part of this alternative. Although the plume is stable and shrinking, and MNA will effectively reduce the mobility, toxicity, and volume of groundwater contaminants currently present at the site, the lack of an active treatment system causes this alternative to fail the criterion.

Alternative 3 is expected to partially meet this criterion. An ERD remedy would consist of injections of an electron donor directly to groundwater, which would create anaerobic conditions amenable to the release of metals (iron, manganese, arsenic) naturally-occurring in the soils beneath the site. This would increase the volume and toxicity of metals in groundwater in the short-term, but not in the long-term as they would attenuate over a number of years. Alternative 3 would effectively meet the criterion with respect to a reduction of toxicity, mobility, and volume of VOCs in groundwater.

Alternative 4 meets the criterion because the technology, if effective, would volatilize the chlorinated VOCs, transferring the contaminant from the dissolved phase to the vapor phase and promoting natural COC degradation under aerobic conditions. Alternative 5 is also expected to meet this criterion. Its effectiveness in reducing toxicity, mobility, and volume would diminish over time as the VOC concentrations decreased, but MNA would continue to reduce concentrations of contaminants in groundwater until cleanup goals are met.

Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternative 1 fails this criterion since it cannot be demonstrated to protect human health and the environment because it would not provide a means to monitor contaminant levels in groundwater.

Alternatives 2, 3, 4, and 5 effectively meet this criterion because they would not impact the community, site workers, or the environment during construction and operation of their respective remedies.

Alternative 2 would have the least short-term impact on the community and workers, since there is no construction associated with the MNA remedy. Alternatives 3, 4, and 5 require construction of their respective remedies, which could potentially pose a risk to site workers

through potential exposure to COCs in soil, soil vapor, and/or groundwater. On-site workers would minimize exposure to COCs by limiting contact with the groundwater, conducting site activities under a site-specific HASP, and use of appropriate personal protective equipment.

Another aspect of short-term effectiveness is the amount of time required to achieve the remediation goals. Alternative 2 would take the least time to reach cleanup goals for VOCs relative to other alternatives, as VOCs are expected to naturally attenuate by 2015. Alternatives 3, 4, and 5 require the design and construction of their respective remedies before treatment begins, which may take up to several years. Given this timeframe, groundwater may reach (or be very close to) cleanup goals by the time the remedy begins operation. So it is anticipated that although Alternatives 3, 4, and 5 would theoretically reduce VOC concentrations more rapidly than MNA alone, this may be irrelevant due to the time required to begin operation of an active remedy.

For the metals iron, manganese, and arsenic, Alternative 2 is expected to meet cleanup goals by 2039. Alternative 3, however, will release metals in large quantities due to the effect of injecting electron donors into groundwater, as observed in the 2008-2010 ERD pilot study. It is expected that because metals concentrations will increase, Alternative 3 will take considerably longer than other Alternatives to meet cleanup goals for iron, manganese, and arsenic. Alternative 4, air sparging, will oxygenate groundwater and create conditions more favorable to the rapid attenuation of metals. It is expected that air sparging will decrease the amount of time to reach cleanup goals for metals within the radius of influence of the system. Groundwater extraction and treatment, Alternative 5, may also potentially reduce the time required to reach cleanup goals for metals in areas that the treatment system impacts. Alternatives 3, 4, and 5 would be designed for the primary purpose of reducing VOCs in groundwater and their targeted area of influence would be the location of the VOC plumes. These alternatives utilize MNA for the areas outside their zone of influence, and to reach cleanup goals after the operation of the selected remedy. Since there is no exposure pathway to groundwater and ICs will prevent exposure to contaminated groundwater, the timeframe for reaching MCLs for metals in Alternative 2 is acceptable.

Generally, Alternative 2 is the most effective remedy considering the timeframe required to reach cleanup goals, as well as time required to design and construct the remedy.

Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Alternative 1 fails this criterion since it cannot be demonstrated to protect human health and the environment because it would not provide a means to monitor contaminant levels in groundwater.

Alternative 2 has the highest implementability because it would not require any additional treatment components or mechanical systems. Further, a routine groundwater monitoring program is already implemented at the site and can be easily revised, as needed, to implement an MNA-focused monitoring program.

Alternative 3 meets this criterion, as indicated by the implementability of the pilot ERD evaluation, which could be scaled up for full implementation.

Alternative 4 would need site-specific air-sparging testing to verify that delivery of air could achieve coverage at a reasonable pressure. Experience at other sites with similar lithology located within the Central Valley has shown that air sparging can be an effective remedy. Therefore, this alternative meets this criterion.

Alternative 5 meets this criterion. The construction of an extraction and treatment system could be implemented, as it was implemented previously. However, design considerations would have to be taken to be able to extract and treat groundwater more efficiently than the previous system, which had multiple technical difficulties.

Although all three alternatives are implementable, Alternative 2 does not require any additional construction, so it ranked higher than Alternatives 3 and 4.

Cost

EPA compares each alternative based on capital cost, annual operation and maintenance cost, and overall present value cost, which is a measure of the total future project cost over a 30-year timeframe.

Alternative 1 has no cost since it does not include a groundwater monitoring program.

Alternative 2 is the least expensive option, and the net present worth (2011) is estimated to be $1,331,000 for 30 years. The estimated net present worth includes the installation of 12 additional monitoring wells and semiannual sampling of 18 wells for 30 years. It is not expected that additional groundwater monitoring wells will be needed to monitor the effectiveness of the remedy. However, this cost was included to indicate the highest potential cost of the MNA remedy.

Alternative 3, ERD with MNA and ICs, is anticipated to cost $2,700,000 (net present dollars) for construction of injection wells and the associated groundwater monitoring program.

Alternative 4 will likely require a refined delivery system to work effectively. A field pilot would be needed to verify design and operational parameters. The system would likely require a small radius of influence for each well (assumed at 15 feet in the FFS), increasing the number of wells needed to provide active treatment over the target footprint. The estimated net present value for Alternative 4 is $2,995,000 for this option.

The net present value of the estimated cost for Alternative 5 is $2,700,000. The cost for this alternative includes installation of groundwater extraction wells and the operation of the associated groundwater monitoring system.

Modifying Criteria

State Acceptance

Both DTSC and the RWCQB reviewed the remedy for the site and concur with EPA's selected remedy, MNA with ICs.

Community Acceptance

There were no community members in attendance at the Proposed Plan Public Meeting on September 6, 2012. Community members did not submit written comments on the proposed plan during the public comment period. Since there were no objections raised regarding the proposed amendment to the remedy, EPA assumes that amending the remedy is acceptable to the community.

K. PRINCIPAL THREAT WASTES

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable. The principal threat concept is applied to the characterization of source materials at a Superfund site, such as contaminated sludge, soils, sediments, or drummed wastes. Contaminated groundwater generally is not considered to be a source material. Thus, no principal threat is addressed through this ROD Amendment.

However, the OU-2 ROD, as amended by the 1996 ESD, 2001 ESD, and 2006 ROD Amendment, addresses principal threat wastes found in soil that are "potentially mobile due to subsurface transport (e.g., leaching into groundwater)." The soil neutralization, capping activities and active SVE system selected by these decision documents address principal threat waste in the soils operable unit.

L. SELECTED REMEDY

Based on information currently available, EPA believes the selected remedy meets the threshold criteria and provides the best balance of tradeoffs, when compared to the other alternatives, with respect to the balancing and modifying criteria. EPA expects the selected remedy to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs (or justify a waiver); (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

EPA's selected remedy is Alternative 2, MNA with ICs, which will protect human health and the environment and achieve ARARs. Though significant biological degradation does not appear to be occurring, other physical processes have been reducing contaminant concentrations since the pump and treat system was turned off in 2005 and since the conclusion of the 2008-2010 ERD Pilot Study.

The cost of the MNA remedy, in net present dollars, is estimated to be $1,331,000 over 30 years. The estimated net present worth includes installation of 12 additional monitoring wells and

semiannual sampling of 18 wells for 30 years. Additional groundwater monitoring wells will not likely be needed to monitor the effectiveness of the remedy. Therefore, this cost is an estimate of the highest potential cost of the MNA remedy.

MNA Attenuation Timeframes

During 2011, VOCs were detected in five wells above their respective cleanup goals for one or more constituents. Sampling results from February 2012 indicated only three wells remained impacted by elevated VOC concentrations. Data suggest anaerobic biodegradation alone may no longer be an appropriate natural attenuation mechanism for cis-1,2-DCE, 1,2-DCA and vinyl chloride. However, as anaerobic biodegradation occurs at this site in combination with aerobic biodegradation, concentrations of cis-1,2-DCE, 1,2-DCA and vinyl chloride will continue to decrease. Continued significant biological degradation is not expected and the primary mechanism for natural attenuation will be physical processes.

To estimate a timeframe needed for concentrations of VOCs in groundwater to reach remedial objectives, a first-order rate analysis was performed as part of the FFS Addendum. The analysis was completed for 1,2-DCA and cis-1,2- DCE concentrations in monitoring wells MW-43, MW-44, and MW-45, because they are the only constituents and wells that have consistently yielded COC concentrations above remedial objectives in recent sampling events. The simple first-order rate analysis suggests that 1,2-DCA and cis-1,2-DCE concentrations are projected to decrease to below remedial objectives in all three wells by approximately 2015.

Iron and Manganese Attenuation Timeframes

Iron and manganese cleanup levels, 300 µg/L and 50 µg/L respectively, were selected in the 1989 ROD for the site. These values were derived from the secondary Federal MCL and are based on aesthetic drinking water qualities (taste and odor), not risk to human health. Iron and manganese, which are naturally occurring in the soils beneath the site, were detected in groundwater monitoring wells and are thought to have gone into solution as a result of the site contaminants coming into contact with groundwater. The footprint of the elevated iron and manganese at the site is much larger than that of the remaining VOCs, as the metals plume extends approximately 1,900 feet downgradient from the source area. The iron and manganese plumes are well-defined by the groundwater monitoring network.

Elevated iron and manganese concentrations are also seen in the location of the ERD pilot study conducted from 2008-2010. The sodium lactate injection enhanced reducing conditions in groundwater leading to mobilization of iron, manganese, and arsenic (discussed in following section). Since the pilot study, iron and manganese concentrations have generally been declining, but are not expected to fully attenuate to the cleanup level until groundwater in the vicinity of the well is restored to its natural, aerobic state. This will happen as VOCs continue to attenuate, groundwater from upgradient flows through the site, and the operation of the ongoing OU-2 SVE system provides oxygen to the vadose zone (and indirectly, over time, to groundwater). Similarly, groundwater impacted outside of the ERD pilot study area will meet MCLs over time as upgradient groundwater flows through the site, creating more aerobic conditions.

During 2011, concentrations of iron and/or manganese exceeded the selected cleanup goal in approximately 10 wells. According to the analysis in the 2012 technical memorandum, "Natural Attenuation Analysis of Select Metals in Groundwater", it is estimated that all wells will meet their selected cleanup goals by no later than 2039, approximately 27 years from the finalization of this proposed remedy. Cleanup timeframes for the various wells range between one year and 27 years, depending on the trend analysis of each well. For wells where aerobic conditions are observed, attenuation timeframes are shorter and are directly calculated using an analysis of the concentration trends. For wells where anaerobic conditions persist and concentration trends are increasing, approximate timeframes are determined by examining surrounding wells and/or considering VOC attenuation timeframes for the well. For instance, since it is believed that groundwater conditions in the ERD pilot study-influenced area will become more aerobic as VOCs attenuate over time, the calculated VOC attenuate date is considered analogous to an early potential date for metals to begin decreasing in that well. For a total of three wells, this type of analysis was used in lieu of a direct concentration trend analysis.

Since there is no human health risk associated with ingesting water with iron and manganese, and there is no exposure pathway, monitored natural attenuation is an appropriate remedy for these metals. Continued monitoring of groundwater will verify whether progress is being made towards reaching the selected cleanup goals for iron and manganese.

The only wells with elevated concentrations of iron and manganese that were not evaluated in the attenuation timeframe were MW-40 and MW-41. The source of these elevated metals concentrations is not the Purity Oil Site, so these wells are not considered in the attenuation timeframe for metals. These groundwater monitoring wells are located directly north of the site, are cross-gradient of the contaminant source, and sampling results have never shown elevated VOCs. The Producer's Cotton Oil Company, a state-lead cleanup site, is located directly east (upgradient) of these wells and is the likely source.

Adoption of Arsenic Cleanup Standard and Attenuation Timeframe

Arsenic was listed as a groundwater COC in the 1989 ROD. However, since it was not detected in elevated concentrations at the site, no cleanup level was selected at the time of the ROD. Arsenic was added to the monitoring program in 2002 at the request of EPA, after it was detected in multiple background wells at low concentrations (less than 10 µg/L, the Federal primary MCL). Since arsenic is naturally occurring in the soils beneath the site, the presence of low concentrations of arsenic in groundwater was determined to be unrelated to the original release of contaminants at the site.

An ERD pilot study was conducted in the northeastern portion of the site between 2008 and 2010. Monitoring wells located within the influence of the ERD pilot test area first exhibited concentrations of arsenic consistently above the MCL of 10 µg/L in late 2008, following lactate injection. The ERD pilot test initiated in 2008 enhanced reducing conditions in groundwater leading to mobilization of some naturally occurring metals, most notably manganese and iron, but also arsenic. Since the pilot study, arsenic concentrations have generally been declining, but are not expected to fully attenuate to the cleanup level until groundwater in the vicinity of the well returns to its natural, aerobic state. According to the analysis in the 2012 technical memorandum, "Natural Attenuation Analysis of Select Metals in Groundwater", this will occur

by approximately 2039 as VOCs continue to attenuate, upgradient groundwater flows through the site, and the operation of the ongoing OU-2 SVE system provides oxygen to the vadose zone (and, indirectly, to groundwater). Currently, sampling results from two wells have shown arsenic concentrations exceeding 10 μg/L in the last year. A trend analysis of the two wells indicated that PT-3A is generally seeing a decreasing trend in arsenic and is expected to meet the MCL by mid-2013. Well MW-45, however, is still seeing an increasing trend due to persistent anaerobic conditions and, as explained above, is expected to attenuate by 2039.

This ROD Amendment is adopting the Federal primary MCL (10 μg/L) for arsenic as the cleanup standard at the site, because a site remediation activity caused the release of arsenic into groundwater. As discussed before, the elevated arsenic concentrations at the site are isolated to two groundwater monitoring wells, and are expected to attenuate to the MCL by 2039.

Relationship to OU-2 Remedy

It is important to acknowledge the influence of the OU-2 remedy on the groundwater operable unit. The active SVE system that is part of the selected remedy for OU-2 has been operating since July 2010. Continued operation of the SVE system will: 1) capture soil vapors contaminated with VOCs for ex-situ treatment; 2) prohibit migration of soil vapors from the shallow vadose zone into groundwater; 3) provide oxygen to the vadose zone and shallow groundwater to encourage natural attenuation of sorbed or dissolved-phase COCs; and 4) remove VOCs from the deep vadose zone that has recently been exposed due to decreasing groundwater elevations in the area.

Prevention of contaminant migration to groundwater was listed as one of the primary purposes/goals of selecting the SVE system as the OU-2 remedy. Soil vapor data will be evaluated in the context of current groundwater impacts to ensure that the SVE system operation is adequately protecting groundwater from further contamination while MNA is operating to achieve cleanup goals. Specifically, soil vacuum response data will be periodically collected and evaluated to demonstrate adequate vapor control over the footprint of remaining groundwater impacts. Collectively, soil vapor vacuum, soil vapor VOC concentrations, and groundwater VOC concentrations will be considered to verify that RAOs are being met and that the operating remedy remains protective.

Institutional Controls

The ICs required in conjunction with the MNA remedy prevent potential exposure to groundwater until MCLs are reached. These ICs would restrict pumping within the groundwater VOC plume. Groundwater within the plume area is not a part of either supply system and no private drinking water wells operate in the area. Moreover, the site is located within the Malaga County Water District boundary, and the installation of private water supply wells is prohibited for most properties. For those not subject to the prohibition, the local codes require submittal of well installation applications to Fresno County and final approval by Malaga County Water District prior to installation. A detailed plan for developing institutional controls on contaminated groundwater associated with the site will be presented in the post-ROD Remedial Design/Remedial Action Work Plan and will rely heavily on local ordinances. As part of the statutory Five-Year Reviews of the site, EPA will review the status of the ordinance and ICs to

ensure existing restrictions on the installation of private wells continue to prevent exposure to contaminated groundwater.

Land use of the Purity Oil Sales property will be restricted in perpetuity through a combination of engineered controls (fencing) and ICs (deed restrictions) that are required as part of the OU-2 remedy to prevent access to the site and the engineered cap.

Post-Decision Monitoring

Groundwater elevation and concentration trends will continue to be evaluated on a routine basis under the site's routine groundwater monitoring program. The Remedial Design/Remedial Action Work Plan, to be prepared after the finalization of this ROD Amendment, will update the groundwater monitoring program for the site.

An active remedy will be evaluated if there is a significant rise in the groundwater table after the adoption of the proposed remedy, or a significant rise in groundwater contaminant concentrations. This evaluation will be performed as part of the Five-Year Review, which will assess the effectiveness and protectiveness of the remedy in place. VOCs are anticipated to attenuate by 2015, and the next Five-Year Review for the site is scheduled for 2016. If it is determined that the remedy is not making significant progress towards meeting cleanup goals within the anticipated timeframes, further remedial action will be evaluated by Chevron. Potential remedies to be considered will include those considered in this alternative comparison, such as air sparging.

M. STATUTORY DETERMINATIONS

Under CERCLA §121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes.

This revision to the remedy is protective of human health and the environment. It is expected to achieve the remedial action objective of returning the contaminated groundwater to drinking water quality. Until this goal is achieved, ICs will remain in place to ensure that there are no exposure pathways to the contaminated groundwater.

This amendment to the remedy complies with all ARARs identified for the site. MNA and continued groundwater monitoring will address the chemical ARARs, which apply to COC concentrations above drinking water standards. Any additional wells constructed for the continued groundwater monitoring program will comply with all ARARs. A full list of ARARs and to-be-considered (TBC) criteria is listed in Appendix A. The other ARARs listed in the 1989 ROD were complied with during the construction and/or operation of the original remedy, but are no longer applicable or relevant and appropriate.

This revision to the original remedy is cost-effective. The other remedial alternatives, including ERD, air sparging, and groundwater extraction and treatment, are more expensive with limited benefit in risk reduction because there are currently no exposure pathways to the contaminated groundwater. Additionally, the ERD remedy would potentially increase concentrations of metal COCs, at least in the short term. While monitored natural attenuation is more expensive than no further action due to the long-term groundwater monitoring component of the remedy, the monitoring program is necessary to demonstrate protectiveness and to comply with ARARs by enabling a future determination that cleanup goals have been achieved.

NCP §300.430(f)(4)(ii) requires a Five-Year Review if the remedial action results in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. Groundwater COCs are still above levels that allow for unlimited use and unrestricted exposure, and Five-Year Reviews will continue, as waste is left in place at the site as part of the soil capping and neutralization remedy for OU-2. Three Five-Year Reviews (2001, 2006, and 2011) have been completed for the site since the original ROD was signed. The next Five-Year Review for the site is required in 2016.

N. DOCUMENTATION OF SIGNIFICANT CHANGES

No objections to the proposed revision to the remedy were received, and the remedy selected in this ROD Amendment does not differ significantly from the Proposed Plan made available on August 20, 2012.

PART 3: RESPONSIVENESS SUMMARY

EPA has complied with the requirements for public participation for this ROD Amendment. The requirements set out in NCP §300.435(c)(2)(ii) have been met. The public comment period for the Proposed Plan began on August 20, 2012 and ended on September 20, 2012. There were no comments received from the public.

A. STAKEHOLDER ISSUES AND LEAD AGENCY RESPONSES

DTSC and the RWQCB concur with EPA's selected remedy. There were no objections raised by DTSC regarding the proposed amendment to the ROD. The memorandum documenting state concurrence will be included in the Administrative Record for OU-1.

APPENDIX A
ARARs

The ARARs are identified on a site-specific basis from information about site-specific chemicals, specific actions that are being considered, and specific site location features. There are three categories of ARARs: (1) chemical-specific requirements, (2) location-specific requirements, and (3) action specific requirements. EPA may consider non-promulgated federal or state advisories and guidance as TBC criteria. Although adoption of TBC criteria is not required, standards based on TBCs that have been selected and adopted in a ROD are legally enforceable as performance standards.

Chemical-specific ARARs are risk-based standards or methodologies that may be applied to site-specific conditions and result in the development of cleanup levels for the COCs at the Purity site.

Location-specific ARARs are restrictions placed on the chemical contaminant or the remedial activities based on a geographic or ecological feature. Examples of features include wetlands, floodplains, sensitive ecosystems and seismic areas.

Action-specific ARARs are usually technology- or activity-based requirements. They are triggered by the particular remedial activities selected to accomplish a remedy.

ARARs selected in this ROD Amendment supersede those provided in the original OU-1 ROD. A summary of ARARs and adopted TBCs for the selected remedy is presented below. This table includes a list of changes from the original OU-1 ROD.

Appendix A: Applicable or Relevant and Appropriate Requirements for the Purity Oil Sales, Inc. Superfund Site, Malaga, California, Operable Unit 1, Groundwater

Requirement	Description	ARAR Determination	Comments
Chemical-Specific ARARs			
California Safe Drinking Water Act • California Health and Safety Code § 4010-4037 • Cal. Code Regs., Title 22, §§ 64401 et seq.	This Act provides for primacy of California with federal SDWA and requires California to set MCLs equal to or more stringent than Federal. California MCLs are relevant and appropriate requirements as aquifer cleanup goals. The SDWA provides for drinking water standards to protect human health from contaminants in drinking water.	Relevant and Appropriate	The California MCLs are ARARs for groundwater at the site.
Action-Specific ARARS			
California Water Code §§ 13750-13755 (I)	Reporting requirements for well construction, alteration or abandonment under the Water Code are relevant and appropriate.	Relevant and Appropriate	The substantive provisions are relevant and appropriate for groundwater monitoring because they contain requirements for well construction.
Chapter 14.08 of the current Fresno County Ordinance Code. This Ordinance governs well construction in Fresno County, and is applicable to extraction well construction.	This Ordinance governs well construction in Fresno County, including distance from potential sources of contamination.	Applicable	Chapter 14.08 of the current Fresno County Ordinance Code governs well construction, pump installation and well destruction standards and any new extraction well construction in the vicinity of the site will be governed by this provision.
DTSC Land Use Covenant Cal. Code Regs., Title 22, § 67391.1(a)	Requires imposition of appropriate limitations on land use by recorded land use covenant when hazardous substances remain on the property at levels that are not suitable for unrestricted use of land.	Applicable	Substantive portions applicable to the remedial action for those properties not cleaned up to allow unrestricted use.
DTSC Land Use Covenant Cal. Code Regs., Title 22, § 67391.1(d)	Requires that land use covenant be recorded where the land is located.	Relevant and Appropriate	Substantive provisions are ARARs for the remedial action for those properties not cleaned up to allow unrestricted use. The land use covenant will be recorded in Fresno County.

Appendix A: Applicable or Relevant and Appropriate Requirements for the Purity Oil Sales, Inc. Superfund Site, Malaga, California, Operable Unit 1, Groundwater (Continued)

Requirement	Description	ARAR Determination	Comments
California Civil Code 1471(a) & (b)	Specific requirements for land use covenants to apply to successors in title to the land.	Applicable	Substantive portions applicable to the remedial action for those properties not cleaned up to allow unrestricted use. Land use covenants will include the requirement that they apply to successors in title to the land.

Notes:

§	Section
§§	Sections
ARAR	Applicable or relevant and appropriate requirement
Cal. Code Regs.	California Code of Regulations
CDPH	California Department of Public Health
DTSC	California Department of Toxic Substances Control
et seq.	And as follows
MCL	Maximum contaminant level
PRG	Preliminary remediation goals
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SDWA	Safe Drinking Water Act
TSD	Transfer, storage or disposal
USEPA	United States Environmental Protection Agency